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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/785,005

02/25/2004

Shigeru Fujita

SON-2612/DIV

9742

23353

7590

11/28/2005

RADER FISHMAN & GRAUER PLLC  
LION BUILDING  
1233 20TH STREET N.W., SUITE 501  
WASHINGTON, DC 20036

EXAMINER

LE, THAO X

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 11/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/785,005

Applicant(s)

FUJITA, SHIGERU

Examiner

Thao X. Le

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5 and 13-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 13-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-4, 13-15 are rejected under 35 U.S.C. 102(e) as being anticipated by US Pub 2002/0190302 to Bojarczuk, Jr.

Regarding claim 1, Bojarczuk discloses a semiconductor device fig. 1 and 4 comprising: a semiconductor substrate 210 [0031], a high dielectric-constant film 220 [0016] on the semiconductor substrate 210, and a nitride layer 430 [0036] & [0038] on the high-dielectric-constant film 220, fig. 6, wherein the high dielectric constant film 220 is selected from film comprised of enhanced dielectric material including  $\text{Al}_2\text{O}_3$  and silicate [[0016] derived from said enhanced dielectric material, and film having multiple-layered structure including at least two layers (220/220), fig. 4, of said silicate film [0016].

Regarding claims 2-4, 14-15, Bojarczuk discloses the semiconductor device further comprises a p-type impurity-contained layer 240 [0009] on the nitride layer 430, fig. 4, wherein the nitride layer 430 is formed by introducing nitrogen in to the top

surface portion of the high-dielectric-constant film 220 [0018], wherein the semiconductor substrate 210 is a silicon substrate [0031].

Regarding claim 13, Bojarczuk discloses a semiconductor device in fig. 1 and 4 comprising: a semiconductor substrate 210, a gate insulating film 220 on a semiconductor substrate 210, and a gate electrode 240 formed on the gate insulating film 220 and including at least a p-type impurity layer [0009] and [0042], wherein the gate insulating film includes a high-dielectric-constant film 220 and a nitride layer 430, fig. 4, on the high-dielectric-constant film 220, wherein the high dielectric constant film 220 is selected from film comprised of enhanced dielectric material of films including  $\text{Al}_2\text{O}_3$ , silicate [0016] film derived from said enhanced dielectric material, and film having multiple-layer structure of at least two layers of said silicate film [0016].

But Jeon does not expressly disclose a gate electrode 108

However, Ramkumar discloses a semiconductor device wherein polysilicon gate layer is being doped with boron to form P-type gate, column 1 line 27-30. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the p-type polysilicon gate teaching of Ramkumar with Jeon's layer 108, because it would have created a p-type gate MOSFETS.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 5 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pub 2002/0190302 to Bojarczuk, Jr.

Regarding claims 5 and 16, Bojarczuk discloses the semiconductor device wherein the p-type impurity-contained layer 240 [0009].

But Bojarczuk does not expressly disclose the boron-contained silicon layer. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use boron to create p-type silicon, because such boron doping to create a p-type layer is conventional in the art, see Ramkumar in column 1 line 27-30.

### ***Response to Arguments***

5. Applicant's arguments filed 27 Oct. 2005 have been fully considered but they are not persuasive. The Applicant argues that Bojarczuk fails to disclose the high-K layer 220 includes  $\text{Al}_2\text{O}_3$  and the barrier 230 is an insulating layer selected from, among others,  $\text{Al}_2\text{O}_3$ . This is not persuasive because Bojarczuk clearly show in fig. 1 step 120 'apply high-K dielectric' or layer 220 in fig. 2-4. The list of high k dielectric includes  $\text{Al}_2\text{O}_3$  or silicates thereof in [0008] and [0016], while the barrier layer 230/330/430 acts as a diffusion barrier [0034] that comprises silicon nitride [0038].

***Conclusion***

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Thao X. Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on (571) 272 -1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thao X. Le  
18 November 2005



LONG PHAM  
PRIMARY EXAMINER